

the following Wednesday, November 17, 1875, in the eighty-third year of his age.

It may be interesting to add that Mr. Vignoles was a lineal descendant of the last Sieur de Prades, the first of this Huguenot family who came over as a refugee to these islands, and who died in Dublin in the year 1721. Of this exile he was the great grandson.

FRIEDRICH WILHELM AUGUST ARGELANDER* was born at Memel, in East Prussia, on the 22nd March, 1799. His father, who was of Finnish descent, was a merchant of that town, whilst his mother belonged to a German family. Their circumstances were such as enabled them to give their son a very careful training and education. Political events brought him into very early connection with historic names. After the battle of Jena the Prussian royal family left Berlin, and took up their abode for some time at Memel. The Crown Prince (afterwards King Frederick William IV.) resided at the house of Argelander's father, and formed there a strong and lasting friendship with the future Professor. Scarcely less intimate were his relations with Prince William, the present Emperor of Germany.

In due course young Argelander was sent to the gymnasium at Elbing, and in 1813 to the Collegium Fredericianum at Königsberg, from which, in April 1817, he proceeded to the University of that town. Although from the first a diligent student, he did not show any special taste for the science in which he was to become so famous until he was attracted thereto by the lectures of Bessel. This led him to request the latter to entrust him with some calculations for the Observatory. The *Fundamenta Astronomiae* had then been just completed; but Bessel put into his hands the reduction of the observations of 67 stars observed by himself at Königsberg, and not previously observed since Bradley, and also the determination of the latitude of the Observatory from observations of circumpolar stars. The results of these labours were published in the 5th part of the Königsberg Observations, in which he introduced our late Associate to the scientific world as "one of his most distinguished pupils." Other calculations followed, and it was not long before Argelander took part also in the observations; the first of importance being that of the occultation of the *Pleiades* on the 29th of August 1820. Soon after that, on the 1st of October, he was regularly appointed as Bessel's assistant at the Observatory—the beginning of a career in which he enriched astronomy with results such as could only be obtained by a combination of uncommon genius with industrious zeal.

His first great labour was assisting Bessel in his survey of

* This notice is principally an abstract of that by Prof. Schönfeld in *Vierteljahrsschrift der Astronomischen Gesellschaft*, Jahrgang x, part 3.

the heavens by zone observations from 15° south to 45° north declination, in which the whole of the microscope-readings of the circle were made by Argelander, and there is abundant evidence in Bessel's writings how highly he appreciated the care and skill with which this assistance was rendered, as well as that in the subsequent reductions. These zone observations commenced in August 1821; earlier in that year Argelander was engaged in observations of stars at low altitude to be used in the formation of Bessel's refraction tables, and also in February and March in the observation of the Comet of 1821.

On the 1st of April 1822, Argelander took his degree as Doctor of Philosophy, after writing a paper, *De Observationibus Astronomicis a Flamsteedio institutis*. Later in the same year he published his able treatise, *Investigations on the Orbit of the Great Comet of 1811*, which made his name known through Europe. No other comet had been observed so extensively and over so long an interval of time; and after the most skilful and elaborate treatment of the observations, Argelander obtained an orbit of the period of 3,065.6 years (to be reduced in the next period to 2,888 years). His investigations were not without their influence upon Bessel's views on the repulsive force of comets' tails, which were further developed by him afterwards in his labours on Halley's Comet and in his controversy with Encke on the resisting medium in space.

On the death of Walbeck, the position of "Observator" at the Observatory at Abo became vacant, and application was made to Bessel to recommend to the authorities at St. Petersburg one of his pupils to supply it. Though exceedingly unwilling to lose him, Bessel named Argelander, and on April 28, 1823, the latter was appointed to the vacant office, and he left Königsberg in the following month, being succeeded there by Rosenberger. His journey to Finland was also his wedding trip, he having married at Königsberg, on the 2nd of May, Marie Sophie Charlotte Courtan; and with her he proceeded, through Dorpat (where he renewed his friendship, commenced in November 1820, with W. Struve) and St. Petersburg, to his new home in the country of his paternal ancestors.

The Observatory at Abo was then newly built and indeed not in all parts quite completed. Its equipment consisted, besides smaller instruments and clocks, of a 2-foot repetition-circle, a Fraunhofer's heliometer, and especially of a very good 8-foot transit instrument by the same artist. A meridian-circle by Ertel was provided in 1825 and was not ready for use until the spring of 1827. Before that time, therefore, the observations principally consisted of comets, and casual phenomena of different kinds. When in possession of the meridian-circle, Argelander undertook a more extended course of observations; and paid special attention in particular to the stars which were known or suspected to have a large proper motion.

In the years 1828 and 1829 Argelander completed Hour XXII. of the Berlin Academy Star-charts, which he had undertaken. It is one of the best of the series, and the accompanying catalogue forms one of the earliest examples of the accurate critical treatment of Bessel's and Lalande's zone observations. In the meantime great changes had occurred at Abo. On the 4th of September 1827 a fire broke out which laid the greatest part of the town in ashes, and destroyed all the buildings, library, &c. of the University. Although the Observatory was protected by its isolated position, and lost nothing but a large number of its impressions of printed observations, yet it was ultimately resolved to remove it as well as the University to the new capital at Helsingfors. Argelander was named Professor of Astronomy at the newly founded University there, and a new Observatory was ordered to be erected by the architect Engel, who had already built that at Abo. The plan was approved in 1830; but difficulties were found in laying the foundation on account of the nature of the soil. Finland was also visited about this time by the cholera, which travelled over Europe; and Argelander took an opportunity, after leaving Abo, of revisiting his old home in Prussia, and renewing his personal intercourse with Bessel. In August 1832 he took up his abode at Helsingfors, though the building of the Observatory was not yet finished. Observations commenced there in the following year; and in November 1834 the meridian-circle was ready for use, the new Observatory being also provided with a Munich refracter of 9ft. focal length and $6\frac{1}{2}$ -in. aperture, observations with which commenced in September 1835.

Argelander devoted himself principally to an extensive series of observations of the brighter circumpolar stars, and to an accurate investigation of his circle, especially of its flexure, by observations of stars and their reflected images. It was whilst at Helsingfors that he printed the Abo observations and catalogue, as well as his well-known treatise on the motion of the solar system deduced from his own observations of 390 stars, with results nearly similar to that formerly obtained by Sir William Herschel.

His stay at Helsingfors was not to be of long duration. The Prussian Government had resolved in 1836 to establish an astronomical institution at Bonn, on the Rhine. In August of that year the Directorship of the Observatory was offered to Argelander; and early in 1837 he took up his residence in Bonn, and energetically commenced the ordering of the instruments and the preparations for the building of the Observatory. As a temporary *locale* in the meantime for observations, he selected a bastion of an ancient fortress close to the Rhine, where he carried on for some years his astronomical work with such means as he had—latitude determinations, comet observations, &c. He also made excellent use of his involuntary leisure in the formation of his “New Uranometry,” or determination of the relative appa-

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rent magnitudes of all the stars visible to the naked eye in Central Europe by direct comparison in the sky, as well as in the connected subject of the changes of magnitude of the variable stars. To the latter he continued to give a great deal of attention afterwards, especially in regard to those interesting stars, *Algol* and *S. Cancri*.

Impatient at the slow progress of the Observatory (as he considered it) Argelander had a small temporary building erected, in which he could use (close to his Rhenish bastion) a 5-foot transit instrument by Ertel, of 4 inches aperture. Having provided this with a sector to determine differences of declination, he commenced extending Bessel's zone observations farther to the north, from 45° to 80° declination. Thus he made 26,424 observations of very nearly 22,000 stars; which, begun in May 1841, were essentially completed, with the aid of an assistant, in June 1843, some gaps being filled up in the subsequent spring.

At last, in the year 1845, the new Observatory was in a position to be used. Its principal instruments were a 3-foot meridian-circle by Pistor, with telescope of 6-foot focal length, and a heliometer by Merz. For some years cometary observations (a large number of which bodies appeared about that time) and observations of the small planets—the long series of discoveries of which had then just commenced—occupied much of the time of the new establishment. But in 1849 Argelander began a new series of zone observations of stars, this time going south from Bessel's limit, or from 15° to 31° south declination. Thus, by May 1852 he had made, in 200 zones, 23,250 observations of more than 17,000 stars. Every precaution was taken by comparison and by observation of known stars to secure the greatest accuracy possible for the results.

But even before the completion of these southern zones, Argelander had formed a plan for a much greater work to extend the knowledge of the starry heavens. Bessel had before conceived the idea of determining the places of all stars down to the ninth magnitude, but had abandoned it for the scheme of the Berlin Academy Star-charts, which, however, after the lapse of a quarter of a century, were unfinished, and, moreover, they embraced only a limited zone.

Early in 1852, therefore, Argelander resolved to commence that great *Durchmusterung*, or survey of all the stars of the northern hemisphere down to the ninth magnitude, and including a large number somewhat fainter than that, with which his name will be for ever associated. The whole number of stars recorded in these zones, between the north pole and 2° south declination, amounted to 324,198, and this gigantic labour, including the laying down of the charts and publication both of them and of the catalogues occupied Argelander and his assistants until the year 1863. They are too well known to astronomers to make any discussion of them necessary here. In the seventh volume of the *Bonn Observations*, published in 1869,

are some interesting investigations into the proper motions of 250 stars, which Argelander was led into by comparison of observations.

He always kept in view the desirability of obtaining accurate meridional observations of all stars down to the ninth magnitude, whose approximate positions are contained in the *Durchmusterung*. It was necessary, if this could be done, that the labour should be shared by different Observatories, and be prosecuted on a uniform system. Thus would a basis be afforded for a much larger number of accurate determinations and observations of every kind. In the year 1867 Argelander laid his plan before the German Astronomical Society, which was afterwards adopted, with trifling modifications. The Bonn Observatory was to undertake one zone of 10° in breadth of declination; but Argelander, now approaching his seventieth year, entrusted the details of the execution to his assistants, engaging himself in labours of smaller compass, such as investigations of stellar proper motion.

Argelander always took a lively interest in the progress of science generally, and also in the affairs of the University of Bonn, of which he was twice elected Rector. Many of the scientific societies of Europe and America made him one of their corresponding or honorary members, and he was chosen an Associate of our own on the 14th of January 1831, being also our medallist in the year 1863.

Until the summer of 1874 he had always enjoyed excellent health; but in August of that year he was attacked by a fever of the typhus kind, which visited the neighbourhood about that time. In the autumn he rallied, and was able to resume some of his labours. But the appearance of recovery was delusive; his strength failed more and more, and, retaining his interest in science almost to the last, a tranquil death early in the morning of February 17, 1875, terminated a life which had been so useful to astronomy. His wife (with whom he had been affectionately united for nearly fifty-two years), two sons, and one daughter, married to Professor Krüger, survive him. W. T. L.

HEINRICH LOUIS D'ARREST was born at Berlin on the 12th of August 1822. His family is of French extraction, his ancestors having been among the Huguenot refugees who settled in Germany after the Revocation of the Edict of Nantes in 1685. In early life his tastes and inclination naturally led him to the study of mathematics, which was followed by its practical application in astronomical calculations and observation even while still a student at the University of Berlin. His name was first brought into notice outside his native city by an independent discovery of Mauvais' second Comet, which he detected on July 9, 1844, two days after it was first seen at Paris. At this time he had attained considerable skill as an observer, as is